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NOTES:

Inventor: Hiroyuki Ikeda
Serial No.: 09/821636
Art Unit: 2811
Filed: March 29, 2001
Attorney Ref.: 075834.00064

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TRANSMITTAL FORM	Application Number	09/821 636
	Filing Date	March 29, 2001
	First Named Inventor	H Royak, Ikoca
	Art Unit	2811
	Examiner Name	Thien H. Tran
Attorney Docket Number		075834 00034
Total Number of Pages in This Submission		

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Appl. No.: 09/821,636 **Confirmation No.:** 5712
Applicant: Hiroyuki Ikeda
Filed: March 29, 2001
TC/A.U.: 2811
Examiner: Thien P. Tran
Docket No.: 075834.00064
Customer No.: 33448

BEST AVAILABLE COPY**APPELLANT'S REPLY BRIEF AND REQUEST FOR ORAL HEARING**

Applicant's submit herewith their reply brief in response to the Examiner's Answer mailed on November 30, 2006. Applicants submit that no new or non-admitted amendment, affidavit, or other evidence is included in this reply.

In addition, Applicants submit and respectfully request an Oral Hearing on the merits in accordance with 37 C.F.R. §41.47. A separate paper requesting the oral hearing is attached to this response.

I. REAL PARTY IN INTEREST

A statement identifying by name the real party in interest is contained in the original Appeal Brief. The real party in interest is Sony Corporation.

II. RELATED APPEALS AND INTERFERENCES

Applicants and the undersigned are unaware of any further related judicial proceedings, appeals, or interferences in relation to the instant Appeal.

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III. STATUS OF CLAIMS

A statement identifying the current status of the claims is contained in the original Appeal Brief. No further amendment to the claims has been submitted or suggested by Applicants or by the Examiner.

IV. STATUS OF AMENDMENTS

No Amendment After Final has been filed or entered by the Examiner. No further amendment to the claims has been submitted or suggested by Applicants in this reply or by the Examiner in his answer.

V. SUMMARY OF INVENTION

A summary of the invention is contained in the original Appeal Brief.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A statement regarding the grounds to be reviewed on appeal is contained in the original Appeal Brief.

VII. ARGUMENT & RESPONSE TO EXAMINER'S REPLY

Applicants note that the rejections set forth in the Grounds of Rejection section of the Examiner's Answer are identical to those rejections set forth in the Examiner's November 2, 2005 Final Office Action. Applicants have addressed each of these elements in their Appeal

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Brief filed on July 12, 2006. Accordingly, Applicants will confine their argument to addressing the Examiner's "Response to Argument" section on pages 4 - 9 of the Answer.

Applicants wish to begin their Reply Brief by setting forth at least one issue upon which they and the Examiner agree upon. The limitation in claims 1 and 39 regarding the variation of the threshold adjustment voltage to the second gate electrode via the threshold adjustment means is a functional limitation. Applicant's invention is directed to a device having a means which adjusts a threshold voltage applied to a second gate electrode as a function of which voltage is applied to the first gate electrode. Applicants note that an electronic circuit designer can design a circuit so as to apply an almost limitless number of voltages to either one of a first or second gate in a 2-gate transistor structure. However, the voltage level decided upon by the designer is conventionally set in stone once the device is manufactured. During circuit operation, there is conventionally no way to further adjust or vary the voltage applied to either one of the two control gates to turn the transistor on and off. Applicants submit that this is the entire extent to which the Kubota reference discloses the possibility of adjusting a voltage applied to a second gate electrode. At no point does Kubota disclose a means for adjusting the threshold voltage applied to a second gate electrode during circuit operation or as a function of a voltage applied to a first gate electrode. Even if Kubota disclosed a desire to do so, which it does not, there are no circuit means disclosed in Kubota to accomplish such a function.

Applicant's invention, on the other hand, is directed to an electrical device which is capable of dynamically adjusting a voltage applied to the threshold adjustment gate as a function of a voltage applied to a control gate in a 2-gate transistor structure. Applicant's specification disclose numerous circuit embodiments for accomplishing this. In drafting the

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claims directed to such a structure, Applicants had determined that the use of functional language would make the claim language easier to comprehend and the scope of coverage of any patent issuing on the claims easier to ascertain by one of ordinary skill in the art. This benefits Applicant's ability to enforce their property interest in any issued patent, and benefits the public by providing for a clear definition of scope so that competitors may discern where the boundaries of the patent monopoly ascertained stops and may design their devices accordingly.

On pages 7 to 8 of the Examiner's Answer, the Examiner sets forth the assertion, supported by several case law citations, that the functional limitation "for adjusting the threshold voltage by applying a first threshold adjustment voltage to the second gate electrode when the first gate electrode receives a first control voltage and applying a second threshold adjustment voltage different than the first threshold adjustment voltage to the second gate electrode when the first electrode receives a second control voltage" in claims 1 and 39 is non-limiting since it has been held that claims directed to apparatus "must be distinguished from the prior art in terms of structure rather than function." (The Examiner cites to the *In re Danley case*, 120 USPQ 528, 531 (CCPA 1959)). The Examiner also cites to the *Hewlett Packard v. Bausch & Lomb* case for the proposition that "Apparatus claims cover what a device is, not what a device does." Applicants submit, however, that both of these cases are inapposite to the facts at issue in this case.

First, Applicants submit that claims 1 and 39 include means plus function language, which is explicitly allowed for by 35 U.S.C. §112p6. Applicants submit that where means plus function language is used to define the characteristics of a machine or manufacture invention, claim limitations must be interpreted to read on only the structures or materials

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disclosed in the specification and "equivalents thereof." MPEP §2106, Rev. 3, Aug. 2005. The Examiner has failed to show where such means are disclosed, taught, or suggested by the Kubota reference.

In the event that the language in claims 1 and 39 is not construed as means plus function language, Applicants submit that the case law cited by the Examiner does not control under the facts in this case. Rather, Applicants submit that the current state of the law allows for functional statements in apparatus claims as long as the boundaries of the claimed invention are clearly delineated in the claims.

In regard to the *In re Danley* case cited by the Examiner, Applicants note that the court upheld the patentability of the majority of the claims (claims 3 – 9). *In re Danly*, 46 C.C.P.A. 792, 797 (C.C.P.A. 1959). The only claims the court struck down in that case included the limitation "such that alternating current may be passed through the tie rod to heat the same." *Id.* This limitation is clearly non-limiting as it not only includes the term 'may,' but also describes an intended use. Applicant's claim, on the other hand, clearly requires a positive limitation: a circuit 'means' for performing the indicated function. Furthermore, no optional language such as 'may' is included. The device must include a circuit means for performing the defined function.

In the *Hewlett Packard* case, the court was dealing with an assertion by Bausch and Lomb that "HP [must] show 'operational differences' of the claimed device over the prior art." *Hewlett-Packard Co. v. Bausch & Lomb*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). The court responded that "Claim 1 of LaBarre is an apparatus claim, and apparatus claims cover what a device is, not what a device does...An invention need not operate differently than the prior art to be patentable, but need only be different." *Id.* (emphasis added). Such a fact

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pattern, dealing with an infringement argument made by one of the parties, fails to shed any light on the patentability of apparatus claims including functional language. Additionally, the underlined portion of the court's reasoning does not imply that an invention, which only operates differently than the prior art, is not patentable, but merely sets forth the fact that the invention need not operate different than the prior art in order to be patentable. The statement is permissive not mandatory.

In contrast to the Examiner's arguments, and consistent with MPEP §2173.05(g), Applicants submit that "There is nothing inherently wrong with defining some part of an invention in functional terms." *MPEP §2173.05(g)*, Revision 3, August 2005. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). The Court of Appeals for the Federal Circuit addressed the issue as recently as 1998, stating that while hybrid apparatus and method of use claims should be analyzed closely, "...an apparatus claim may include functional limitations." *R.A.C.C. Indus. v. Stun-Tech, Inc.*, 1998 U.S. App. LEXIS 30769 (Fed. Cir. 1998). The court went on to note that they "never determined that functional language in a claim converts an apparatus claim into a method of use or hybrid claim." *Id.* In accordance with MPEP §2173.05(g) and Federal Circuit case law, the claim limitations set forth in claims 1 and 39 clearly define the bounds of the patent protection sought by setting forth how certain components function together. More specifically, the functional claim language requires that a threshold adjusting means (a circuit consistent with the disclosure) applies one of two different threshold adjustment voltages to the second gate electrode as a function of which of two voltages is applied to a first gate electrode.

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As noted by the Examiner at the bottom of page 5 of his Answer, neither of the claims explicitly require that the terms 'first control voltage' and 'second control voltage' be different from each other and limited to any particular voltage. This statement, while accurate, is not entirely precise. The claims require that a threshold voltage adjusting means exist which applies one of two different threshold adjustment voltages to the second gate electrode based on whether a first or a second control voltage is applied to the first gate electrode (i.e., the one of two possible threshold adjustment voltages is applied as a function of the applied control voltage). Applicants submit that, in light of the disclosure in the specification describing the operation of the adjusting means, the first and second control voltages applied to the first electrode must be different in some way in order to trigger the change in threshold adjustment voltage applied to the second gate electrode. This does not mean that the voltage level applied be different, although such a function would be sufficient. For example, if a first voltage source applied a voltage of 5V to the first gate electrode, and then the same source applied a voltage of 8V when a different threshold adjustment voltage is applied to the second gate electrode; such a function would be in accordance with the claims and read on the claim language. It is also true, however, that if a first voltage source supplying 5V to the first gate electrode is replaced with a second different voltage source applying substantially the same 5V level to the first gate electrode, along with a different threshold adjustment voltage applied to the second electrode; such a function would also be in accordance with the claims and read on the claim language.

However, Applicants submit that a same first voltage source supplying 5V to the first gate electrode when a different threshold voltage is applied to the second gate electrode is not within the scope of the claims. Something amounting to a change in the voltage applied to

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the first gate electrode must cause or occur with the change in the applied threshold adjustment voltage applied to the second gate electrode.

The issue is somewhat moot, however, because the Examiner has failed to assert a reference which discloses even this. More specifically, the *Kubota* reference is clearly directed to a design choice of permanently changing the threshold voltage of a particular set of transistors, and fails to provide any means for varying the threshold voltage of any one or more transistors during circuit operation or in response to a change in a control voltage applied to an opposing gate electrode. *Kubota* absolutely fails to disclose, teach, or suggest any circuit means for doing so.

As clearly set out in the abstract of the invention portion of the disclosure, the goal of the *Kubota* disclosure is to allow the absolute value of the threshold voltage of N-type transistors and the absolute value of the threshold voltage of P-type transistors to become virtually equal to each other. Additionally, in the background of the invention portion of the disclosure, *Kubota* states that the prior art method of forming N-type and P-type channel transistors via a polycrystalline silicon thin film on an insulating glass substrate results in "the balance between the driving power of the N-channel transistor and the P-channel transistor to be upset, resulting in an increase in the leakage current of the N-channel transistor." (See Column 3, lines 40 – 67). As a result of this unbalance, "the characteristics of the driving circuits might be deteriorated to a great degree." (See Column 4, lines 1 – 5).

The *Kubota* disclosure is directed to solving this problem by forming a conductive electrode on the other side of the channel of the gate electrode of one of the N-channel or P-channel type transistors in order to balance the driving characteristics between these two groups of transistors. See, for example, column 5, lines 8 - 15, which disclose that "even if

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the threshold voltage of the thin-film transistor is offset in the negative direction or the positive direction from a desired value for a certain reason, it is possible to make virtually equal to each other the absolute value of the threshold voltage of the N-channel type transistor and the absolute value of the threshold voltage of the P-channel type transistor for shifting the threshold voltage by applying a voltage to the conductive electrode.” Importantly, only the threshold voltage of a desired set of transistors is adjusted, and the threshold voltage of these selected transistors is modified by applying a constant voltage to the conductive electrode. The advantages of the invention would not be realized if a different voltage was applied to the conductive electrode during circuit operation or in response to a different voltage being applied to the control gate, as the pre-determined balancing between the V_{th} of the two groups of transistors (P-type and N-type) would be disturbed.

The Examiner, in his rejection and his answer, relies heavily upon the disclosure in Figure 4 of the Kubota reference which shows the electrical effect on the threshold voltage of a transistor of applying a voltage to a counter electrode. Applicants submit that this disclosure, similar to that disclosed in Figure 3A of Applicant’s application, merely sets forth the well-known property that placing a counter electrode across a channel of a gate electrode in a CMOS transistor will affect the threshold voltage required to turn the transistor on or off. Figure 4 of the *Kubota* reference merely discloses how the threshold voltage of one group of transistors can be modified in order to balance the driving characteristics of the two groups of transistors by a circuit designer. When read in light of the remainder of the specification (for example column 12, lines 30 – 31 and 46 - 56 and column 14, line 66 through column 15, line 5, it is clear that the Kubota device is not capable of changing the voltage applied to the

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counter electrode during circuit operation or in response to a change in a voltage applied to a gate electrode and contains absolutely no means for doing so.

Rather, Figure 4 of *Kubota* merely sets forth the electrical characteristics which the circuit designer may take advantage of in deciding to apply a counter electrode and threshold adjustment voltage to a particular group of transistors within the circuit design in order to achieve the desired purpose of balancing the driving characteristics of two or more groups of transistors. In contrast to the *Kubota* reference, Applicants disclosure in regard to their Figure 3, on pages 20 through 21 of the specification, clearly discloses the utilization of this electrical phenomenon in order to actively control the threshold voltage of the transistor during circuit operation and in response to a change in the voltage applied to the gate electrode in order to decrease consumed power, erroneous operation, and to improve yield (See page 45 of Applicant's disclosure).

In summary, the *Kubota* reference fails to disclose anything beyond the well-known electrical effect of applying a counter electrode and threshold adjustment voltage to the counter electrode. Nothing in *Kubota* discloses the active adjustment of an applied threshold adjustment voltage during circuit operation in response to a change in an applied voltage to a gate electrode or a means for doing so. Rather, the *Kubota* reference actually teaches away from such a function by requiring that a constant voltage be applied to the conductive electrode in order to balance the threshold voltage of one group out of two or more groups of transistors. For at least this reason, the Examiner's rejection should be overturned on appeal, and claims 1, 2, and 39 – 41 placed into condition for allowance.

Applicants respectfully traverse the Examiner's statement on page 6 of the Examiner's Answer that Applicant merely "speculates that the threshold adjustment voltage

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to the second gate electrode does not change and consequently the value never changes during circuit operation” and that “appellant errs in his remark because the term ‘constant voltage’ does not mean ‘fixed voltage’ or ‘permanent voltage’ and the claims does not exclude a ‘constant voltage.’” First, the *Kubota* reference continuously and repeatedly uses the word ‘constant’ to mean that the voltage applied to the threshold adjustment gate is a design choice and is not variable during circuit operation or in response to a change in an applied gate electrode. For example, see the Abstract of the Invention section, line 7, column 4, line 63, column 6, line 56, column 12, line 30, and claim 1, line 10. As discussed above, *Kubota* fails to disclose any desire or means to modify the applied V_{th} value during circuit operation or in response to a change in a voltage applied to the control gate. Furthermore, and as also discussed above, to read the *Kubota* reference as teaching such a modification would render *Kubota's* goal of achieving improved operation speeds and holding characteristics by setting the V_{th} of the p-channel or the n-channel transistors in order to balance the driving requirements of these two sets of transistors unobtainable.

In specific regard to the Examiner’s request for Applicants to explain the difference between Fig. 4 of *Kubota* and Fig. 3A and 3B of Applicant’s disclosure, as noted above, Applicants agree with the Examiner that both Figures show substantially the same thing: the threshold voltage of a transistor can be modified by applying a different threshold adjustment voltage to one gate electrode of a two-gate electrode structure. The difference between Applicant’s invention and the *Kubota* reference, however, lies in the supporting specification. As clearly set forth throughout Applicant’s specification, for example on page 22 in the first full paragraph to the end of the paragraph on page 23, Applicant’s invention provides for a means for adjusting this threshold adjustment voltage during circuit operation and as a

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function of a control voltage applied to the control gate and provides a means for doing so. More specifically, as noted on page 22, "In the present invention, the threshold voltage V_{th} of the thin film transistor is actively controlled utilizing the basic properties shown in Fig's 3A and 3B." In contrast, Kubota teaches that "A constant voltage is applied to the conductive electrode 14." (See the Abstract of the Invention section, line 7, column 4, line 63, column 6, line 56, column 12, line 30, and claim 1, line 10). *Kubota* fails to make any similar disclosure regarding active control of the threshold adjustment voltage in Column 13, lines 26 – 38, which fully describes Figure 4. For at least this reason also, Applicants submit that the *Kubota* reference fails to anticipate, teach, or suggest the functional claim limitation of Applicant's claims 1 and 39.

As a final note, Applicants would like to address the Examiner's mis-statement regarding 'admissions' made by the Applicant in the original Appeal Brief. The Examiner states on line 4 of page 5 and on line 11 of page 6 of the Answer that "Appellant admits in the Appeal brief (page 9, third [partial] paragraph) that the Kubota reference does suggest the threshold voltage adjustment applied to the second gate can be varied in order to adjust the threshold voltage of a control gate by applying a first threshold voltage (no bias voltage) to the second gate electrode (14) when the first gate electrode (16) receives a first control voltage (V_{gs} approximately 3V on the abscissa of Fig. 4) and applying a second threshold adjustment voltage (bias voltage of -20V) to the second gate electrode (14) when the first electrode (16) receives a second control voltage (V_{gs} approximately 6V on the abscissa of Fig. 4) to adjust the threshold voltage by 2.5V." (See page 5 of the Examiner's reply brief, lines 4 – 12). (Emphasis added). By intertwining Applicant's concession with the Examiner's own statement, the Examiner makes it appear like Applicants made the entire

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admission stated. However, as clearly shown on page 9, 3rd partial paragraph of their original Appeal Brief, Applicants made no statement at all concerning the underlined portion of the above quotation. Applicant's admission solely relates to the well-known prior art ability of a circuit designer to vary the threshold voltage of a transistor by designing a circuit so as to apply a proper threshold adjustment voltage to a threshold adjustment electrode placed in opposition to the gate electrode. Any assertion by the Examiner beyond this is not an admission by Applicants but is the Examiner's own argument, to which the Applicant's respectfully traverse.

In summary, and counter to the Examiner's position, Applicants submit that the *Kubota* reference fails to disclose, teach, or suggest a display apparatus comprised of a plurality of thin film transistors, each of said thin film transistor comprising a semiconductor thin film constituting a channel and having a threshold voltage, and a first gate electrode on one side of said semiconductor thin film and a second gate electrode on an opposite side of said semiconductor thin film, and further comprising a means for adjusting the threshold voltage by applying a first threshold adjustment voltage to the second gate electrode when the first gate electrode receives a first control voltage and applying a second threshold adjustment voltage different than the first threshold adjustment voltage to the second gate electrode when the first electrode receives a second control voltage. Applicant's invention requires as much, and the claims currently reflect these limitations.

In light of the foregoing, Applicants submit that the 35 U.S.C. §§102(e) and 103(a) rejections must be over-turned on appeal, and claims 1 – 3 and 39 - 41 be placed in condition for allowance.

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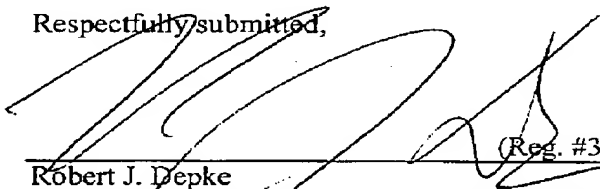
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CONCLUSION

In light of the foregoing, Applicant reiterates that the rejections of all claims are improper for the reasons noted and the rejections should all therefore be over-turned and this application should be placed in condition for allowance.

Respectfully submitted,

Date: January 30, 2007


Robert J. Depke

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VIII. CLAIMS ON APPEAL:

A current and proper listing of the claims on appeal is contained in the original Appeal Brief.

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IX. EVIDENCE APPENDIX:

None.

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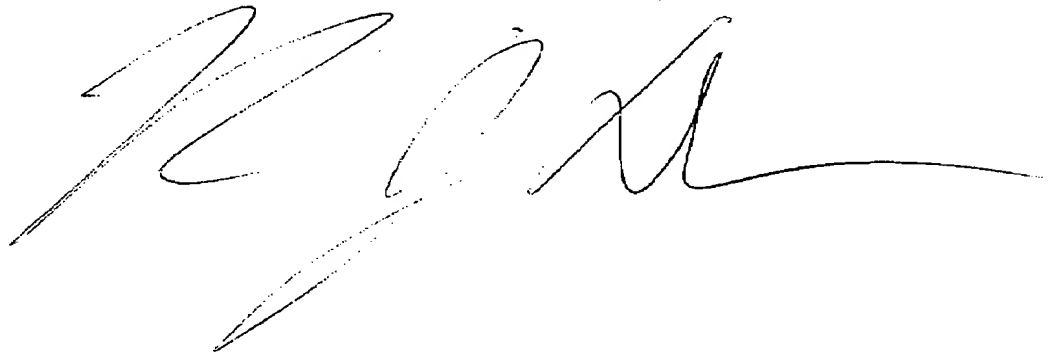
X. RELATED PROCEEDINGS APPENDIX:

None.

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XI. REQUEST FOR ORAL HEARING

In accordance with the requirements of 37 C.F.R. §41.47, Applicants respectfully request an oral hearing in order to properly present the issues and matters contained herein on appeal. Applicants respectfully request that all required fees be charged to Deposit Account #50-3891.

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